

# **HALAL FOOD CHECKER ANDROID APPLICATION USING BARCODE SCANNING TECHNOLOGY**

by

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Universiti Teknologi PETRONAS,  
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## CERTIFICATION OF APPROVAL

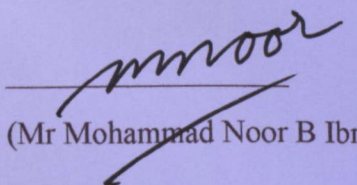
### **Halal Food Checker Android Application using Barcode Scanning Technology**

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Azween Azreen Bt Jamal

A project dissertation submitted to the  
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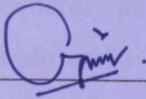
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## CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.



(Azween Azreen Bt Jamal)



## ACKNOWLEDGEMENT

### ABSTRACT

Muslims nowadays are exposed to a lot of uncertainties in determining food's Halal status such as with the issue of fake Halal logo, non Muslims food manufacturer, imported foods from non-Islamic country and many others. The purpose of the project is to study, design and develop a mobile application that will enable the Muslims to check food product Halal status in the market. The scope of this project is focused on manufactured food and the target user for this product would be the Muslims. Questionnaires have been distributed twice; to verify the problem statement and to test user acceptance. Among the result collected are fourty-eight percent of the respondents do not aware of the current issue related to Halal matters. Besides that, seventy-percent of the respondents would like to use the application developed frequently as part of their daily life. Hopefully, with the presence of this solution, it could assist Muslims as a whole in getting Halal food product wherever they go in this world.



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# CHAPTER 1

## INTRODUCTION

### 1.1 Background Study

Islam has set guidelines for all Muslims to follow. One of the guidelines is on Halal and Haram. Halal means permissible in shariah law while Haram is the opposite of Halal. This Halal concept is very wide. It involves activities in everyday life, food, banking sectors and many more. Islam put great concern in this Halal guideline as it involves activities in Muslims' daily life and Muslims believe that this guideline is meant to preserve Muslim's faith, health and maintain the harmony of the society.

One of the main items in Halal guideline is food and beverages. It is the closest thing for people including the Muslims as several times a day, a person need to eat food in order to get the energy for daily activities. Food especially manufactured food product faced a lot issues which may give treat to the Halal status of it such as non Muslims food manufacturer and also non established organization that issue the Halal certification to the product apart from the issue of fake Halal logo. Upon realizing this issue, this project focuses on assisting Muslims in determining manufactured food product's Halal status.

As the number of Muslims is increasing day by day, many food product manufacturers in which the majority are non Muslims strive to penetrate this market by showing to the consumers that their products are Halal. Somehow, Islam has certain guidelines in determining the Halal status of food products. Many non Muslims do not truly understand this Halal concept and its guidelines. The only thing that they know is that, food which contains pork is prohibited for Muslims but they do not know that it is more than that. There are many factors that should be considered to determine food's Halal status such as the way the animal is being slaughtered, the equipments whether it has been used to process any pork related food and others.



In Malaysia, there is one organization that is responsible to governs this Halal matters that is the “Jabatan Agama Islam Malaysia” (JAKIM). This is the organization that issues the Halal certification to food manufacturer after performing certain procedures and it is also responsible to always monitor the certification that it has issued. Globalization which allows other countries to export food product into Malaysia has made this organization to expand their responsibilities. Apart from making sure local products’ Halal status, this organization also has open up the scope to overseas product by collaborating with other similar organizations from other countries and checks whether they are conform to the standard and guidelines in Islam.

This step has helped widen the choices for Muslims especially for food product as Muslims can now enjoy imported products. Somehow, imported products may have Halal certification and many not. The problem is that the Halal certification on the product’s packaging may not issued by the Islamic organization that is approved by JAKIM. This may create confusion to the Muslims as they cannot determine the integrity of the Halal certification other than they might also confuse it with the overseas Halal certificate that was approved by JAKIM.

Apart from that, there are also many issues revolves around Halal logo that is printed on food packaging. Among the problems are manufacturer displaying fake Halal logo in which they print the Halal logo from any Islamic organization although they never received the Halal certification or manufacturer-made Halal logo that is they just write Halal in Arabic words and printed it in their products’ packaging.

This causes Muslims to be in dilemma when purchasing product as they cannot ensure the validity and accuracy of the products’ Halal status. Therefore, this project is meant to help Muslims with the dilemma that they are having.



## **1.2 Problem Statement**

1. There are many issues revolving manufactured foods' Halal status such as those products that display fake Halal logo and also too many different Halal logo from many different organizations available in the market.
2. Consumers especially Muslims do not aware of the issues with regards to products' Halal status.
3. Current Halal checking technologies are less efficient thus the technologies are not able to assists the Muslims' in choosing Halal products effectively.

### **1.2.1 Problem Identification**

Consumer nowadays has becoming wiser in choosing and buying products especially Halal products. Upon realizing that, manufacturers also have started moving towards Halal industry to maintain their products market and also their products competitiveness. Somehow, as more manufacturers are striving to have Halal certification logo on their products packaging, this leads to the arising of problems with Halal certificate validity.

One of the main problems is that, there are many organizations that issues Halal certification out there regardless whether they are following the standards or not. Therefore, this could lead consumers to be tricked or confused with the Halal certification when buying products.

Other than that, there are also issues where the products manufacturers displaying unrecognized Halal logo such as the logo that shows Halal word in Arabic. The actions could be either lack of knowledge on the Halal concept or ignorance (Power, C., 2009). Many product manufacturers is non muslims, therefore,



they only believe that a product is Halal if there is no element of pork in the product. Somehow, there are also other factors that need to be considered such as the processes involved and also the resources of the items ingredients (Riaz, M.N., 2004).

Besides that, there are also imported products in which the products will be using different Halal certification logo, thus, increase the variety of Halal certification logos in the market. It will make it harder for the Muslims to be certain of product's Halal status as they do not have much knowledge whether the Halal certification issuer body is following the standard or not.

Somehow, in Malaysia, there is Department of Islamic Development Malaysia (JAKIM) that is responsible in checking products' Halal status as long as the manufacturer requested for JAKIM Halal certification. Other than issuing Halal certification to local products manufacturers, JAKIM also inspect the international organizations that issues Halal certificate. Therefore, consumers may choose products with JAKIM Halal certificate or products with certificate that been issued by JAKIM's recognized Halal certificate issuer.

Although JAKIM has all the Halal related information required by the consumers especially the Muslims, but there is no efficient platform for conveying the information to the consumers especially at times of needs like the times when consumers are buying products in the market. JAKIM has taken initiatives to provide platform for consumers to get the products information such as the e-Halal portal and also SMS e-Halal. There are two technologies that have been implemented by JAKIM for consumers to check product's Halal status. One of it is e-Halal portal and the other one is SMS e-Halal (Projakim, 2006).

e-Halal portal consists of information about JAKIM, news related to Halal matters other than source of reference for not only the consumers but also for the industry or the manufacturer to understand better about Halal certification matters (Utusan Malaysia, 2005). Though this portal make it easier for the consumer to check



product's Halal status, but its limitation in terms of mobility makes it not that efficient for the consumers to use it in when they are buying products in the market.

Realizing the needs of customer to have information while on the go, JAKIM also introduced SMS e-Halal (Projakim, 2006). Consumers just need to type HALAL "Product Barcode" and send to DAPAT (32728). Supposedly, consumers shall receive the response within minutes. Although this technology is able to overcome the limitation of e-Halal portal in terms of mobility, this implementation also has its own weaknesses. One of the weaknesses is it requires the user to pay fifteen cent per SMS send and fifty cents per SMS receive. Basically, consumers need to pay sixty-five cents for every item that they want to check. Somehow, that would be very costly if the consumer wants to check all the items that she is buying (Ariff, M. M., 2009). The second weakness with this implementation is that consumers need to look for the product's barcode and type it to their mobile phone before sending it to DAPAT. It is very tedious especially when the consumer is in the midst of shopping. This brings to the next weakness of this implementation that is it is very time consuming. Time is involved when the consumer need to type the product's information and send it to the system. Besides that, the consumer also needs to wait for the system to respond to the SMS sent which very often took sometimes (Ariff, M. M., 2009).

### **1.2.2 Problem Significant**

Based on the problem identification above, it can be deducted that consumers are having serious problem in validating products' Halal status. There are just many issues that cause the problem to happen.

This means, consumers is in need of a tool or application that could help them validating food products' Halal status. As there are many factors that are needed to be taken into account in determining products' Halal status, so, the best way to determine products' Halal status is to check it from authorized organization which responsible in monitoring and governs Halal matters and for this country, it would be JAKIM.



## 1.3 Objectives

Although JAKIM has introduced two technologies that act as a platform for user to check product's Halal status, but the limitations posses by the technologies implemented causes they are hard to be accepted by the consumers. Therefore, a new tool or application need to be developed to help the Muslims with the problem in validating products' Halal status. The tool developed should also overcome the limitations with the current technologies implemented.

## 1.4 Research Objectives

Therefore, a study should first be made to understand the situation when consumers are in need of the Halal checker and also to understand users' requirements and behaviour. For example, consumers would need to check the products' Halal status at the times when they want to purchase the product. For the behaviour part, often, consumers would want to settle with their shopping fast as they have other responsibilities such as cook for their family and others. This means, in terms of the characteristics of the tool needed is that, the tool should be very convenience and also easy and fast to use.

Other than that, a research on the problems with the current technologies also should be made so that there will be no repetition of the same mistakes that have been done before.

There is also a need to study the current technologies that people are coming up with so that, the research that they have made could provide better understanding of the problem with current technologies other than to prevent coming up with the same solution. Somehow, it is possible to come up with similar idea but more improvement should be made.

### 1.3

### Objective

1. The objective of the project is to research and study the best solutions to determine manufactured food Halal status.
2. The second objective of this project is to design and develop mobile application to determine manufactured food Halal status

### 1.4

### Scope of Study

The most important aspect of this project is validating product's Halal status from JAKIM's database so that the information is accurate. There are many types of items that are inspected by JAKIM such as food, equipments, meat, cosmetics and many others. Among all, the closest and most important to the Muslims consumers are manufactured food.

Therefore, this project is focused on validating food Halal status of manufactured food. There are many reasons for manufactured foods are chosen as the scope for this project other than because of the closeness to the Muslims consumers. There are many details that could be extracted from manufactured food such as the food ingredients, expiry date, manufacturer, nutritional facts, barcode and many others. Therefore, any of these information could be use to retrieve the Halal information and also be displayed as the result of the search.

Other than that, manufactured food comprises the most food products in the market. Therefore, the market for the application developed would be big.

Besides that, the scope of this project would focus on Muslims consumers as this project is meant to assist Muslims in facing the challenges in obtaining Halal food products in the market.



## **CHAPTER 2**

### **LITERATURE REVIEW**

This chapter is divided into three parts. The first part is matters with regards to Halal. In this part, several matters would be covered. The first one is on the Halal concept, then the issues revolve around Halal matters and the last one would emphasize on the reason for choosing JAKIM's database as the main reference in determining products' Halal status.

The second part would focus on matters with regards to the current technologies such as to provide an overview of the current available technologies in checking products' Halal status. After that, an analysis would be made to study the problems with the technologies available and to understand the reason for them to be unsuccessful.

The last part would be focused on the research done in coming up with the proposed solution. Besides that, this part would also provide detailed information about the technology and tools that would be used in developing the proposed solution.

#### **1.1 Concept Of Halal In Islam**

Halal is an Arabic word which carries the meaning of things or actions permitted by the Shariah law without punishment imposed on the doer. In the concept of food and beverages, Halal means, food that is permissible for consumption by Muslims (Consumer Association of Penang, 2006). Opposite of Halal is Haram. The meaning of Haram is that, the one who does it will be punished and the one who abstains from it will be rewarded, if the reason for his abstinence is following the prohibition of Allah (Latif, M. A., 2011). In the concept of food, Haram is the food that is not permissible by the Muslim to consume (Ariff, M. M., 2009). Somehow, there is also a term for the things that is in between. Islam called it Shubhah or Mashbooh. The



term is an Arabic word which means doubt or questionable (Consumer Association of Penang, 2006). This means, an item could fall into this category when there is an uncertainty about its Halal status.

Muslims are prohibited by Allah from eating pork or pork by products, animals that were dead prior to slaughtering, animals that are not slaughtered properly or not slaughtered in the name of Allah, blood or blood by products, alcohol, carnivorous animals, birds or prey, land animals without external ears (Muhammed, S. A., 2011). Allah has stated in the Al-Quran in surah Al-Baqarah, verse 173.

*He only prohibits for you the eating of animals that die of themselves (without human interference), blood, the Meat of pigs, and animals dedicated to other than GOD. If one is forced (to eat these), without being malicious or deliberate, he incurs no sin. GOD is Forgiver, Most Merciful.*

*(Surah Al-baqarah, verse 173)*

All of this prohibition is meant to make sure the health and harmony in the Muslims' life. Other than that, Halal food can protect Muslims from being distant from Allah, the creator (Ariff, M. M., 2009). Halal food also can prevent a Muslims from being leaded astray as mention by the hadith below.

*The limbs of a man become disobedient who eats unlawful food willingly or unwillingly, knowingly or unknowingly. The limbs of man who eats lawful food become obedient to him and help him in doing good deeds.*

Halal food is also important for Muslims as we believe that if we consume non Halal food, it will be part of our body. We need to make sure that our body is build and consist of only those Halal foods which can make us healthy and prevent ourselves from being astray from the right path. (Ahmad, A.P., 2009)



*“The stomach is the tank of the body and the veins go down to it. When the stomach is healthy the veins come back in a healthy condition, but when it is in a bad condition, they return diseased.”*

## **1.2 Issues Surrounding Halal Products**

Basically, eating Halal food is very important for Muslims. Somehow, in today's world, most of the businesses activities are controlled by the non Muslims including business related to food and beverages manufacturing. This causes the Muslims to faced great challenges in getting Halal food products in the market (Ariff, M. M., 2009). The problem with non Muslim food producer and manufacturer is that, they do not have good understanding about Halal concept in Islam. Most of them only thought that Muslims are only prohibited from eating pork. Somehow, in Islam, there are many other aspects that one should look into before a food product can be confirmed Halal.

There are three main factors for a food producer or manufacturer need to consider in their food products' processing activity (Ali, K.H., 2008). The factors are:

1. The product does not consist of or contain anything which is considered to be unlawful according to Islamic Law;
2. The product has not been prepared, processed, transported or stored using any appliance or facility that was not free from anything unlawful according to Islamic Law;
3. The product should never been in direct contact with any food that fails to satisfy 1 and 2 above in the course of preparation, processing, transportation or storage.

Muslims are always being exposed to non Halal food. The main reason is that, Muslims especially the public do not have the knowledge with regards to food processing activities, the supply chain and all the processes involved in the back ends. One of the examples is on the manufacturing of SimplySiti cosmetics



products. Although this is not related to food, but this problem could also occurs in the food production activities. There was an issue once related to the cleaning process in the SimplySiti cosmetics production line. The fur used for cleaning is confirmed by JAKIM as pig fur (Joe, L., 2011). Somehow, upon realization of the issue, the company take a quick action by tanning all the equipments and once again request for Halal certification from JAKIM.

There are also many other issues that has arise driven by the increase number of non Muslim food manufacturers. Other than the issue of misunderstanding by the food producer, Muslims may also faced problem with fake Halal logo(Ariff, M. M., 2009). Many of the food producers realize the importance of Halal food in Muslim society especially in the Islamic country like Malaysia. Many cases have been reported showing food manufacturers are displaying fake Halal logo (Megat, R., 2010). They are many reasons that could lead them to do such action. One of it is that, they want to attract more buyers (Power, C., 2009) to buy their product as Malaysia is constituted of 67.4% Bumiputras in which mostly is Malay Muslims compared to other races which are Chinese 24.6%, Indians 7.3% and others 0.7% based on the 2011 statistics announced(The Star, 2011). This statistics would carry the meaning, the more the percentage of the race, the wider the market potential within that race. This causes more and more non Muslim food producers are using this technique either out of understanding on the Halal concept or greedy (Nooh, M.N., 2007; Shafie, S., 2006).

Many times, Muslims overlooked on certain matters such as the fast food products which contain meat. One example is that, instant porridge in the market may contain chicken cube. Somehow, how can Muslims determine the chicken they use might not be slaughtered according to Islamic way of teaching? The main reason is that, most of this manufacturer is non Muslim and they might not understand the concept of Halal in Islam.



For this kind of situation, we might need to look back at the trustworthy hadith by the prophet Muhammad which was narrated by Imam Al-Bukhari and Muslim.

*In a Hadith, Nabi (Sallallaahu Alayhi Wasallam) mentions, 'Verily Halaal is clear, and verily Haraam is clear. And between them there are certain doubtful matters many people are unaware of, therefore, who stays away from doubtful matters he has protected his Deen and honour. And who gets involved in doubtful matters, he would fall into Haraam.'* (Bukhari; Muslim)

This situation can make that particular item falls into Shubhah. As a Muslim, we definitely should prevent ourselves from buying or consuming such products.

There are also many other treats that Muslims faced in buying and consuming Halal food products. In this globalization era, import and export is very common. Import and export also involves food products. The problem is that, the products may come from non Islamic country. Therefore, it would be hard for the Muslims to determine the products' Halal status. Some products may also have Halal certification from either Islamic organization from the country of origin or from any private organization. This will make the Halal logo in the market to become abundant. This will create confusion and doubt to the Muslims whether the Halal certification is valid or vice versa.

Muslims also faced problems when buying food products from groceries store. Many of the items sell there comes from those small and medium enterprises (SME). The problem is that, SMEs faced many difficulties in requesting for Halal certificate as they might not have complete documents like the big company such as the "Good Manufacturing Practice" documents(Ariff, M. M., 2009). Although they might not have the Halal certificate, but they still can sell their product in the market as Malaysia does not have the law that make it compulsory for all food manufacturers or producer to have Halal certificate (Consumer Association of Penang, 2006). Products from all of these SMEs are sold in large quantity in the



market due to cheaper price and also easy to get. This makes it harder for the Muslims society to differentiate and choose as many of the groceries store will sell almost similar products, thus left the Muslims society with less options especially during celebration as the product will become a necessity instead of demand.

### **1.3 Islamic Development Of Malaysia (JAKIM)**

In Malaysia, there is one organization that manages and governs Halal related issues. The organization is the “Islamic Development of Malaysia” (JAKIM). This organization is responsible to issue Halal certificate to manufacturer. The Halal certification by JAKIM has also been recognized by countries all over the world as it has been started long ago since the year of 1974(Rahman, L.A., 2011). JAKIM covers wide range of items such as the livestock of land and water animal, cosmetics, chemicals, clothing, equipments and also food products (Hassan, C.H., 2005). There are several procedures need to be followed by JAKIM before they can finally issue a Halal certificate to a products’ manufacturer. Among the steps in the procedure is evaluation on the documents, inspections, evaluation by the committee before they could finally issue the certificate. They will also keep monitoring the company although the Halal certificate has been issued to make sure the company still conforms to the standard put by JAKIM (Hassan, C.H., 2005).

The standards and the procedure taken by JAKIM in making sure the Halal status is very detailed as it inspects all the elements in the manufacturing process until to the basic part such as the supply chain of the resources (Hassan, C.H., 2005). Besides that, JAKIM also follows the standard drafted by Standard Department of Malaysia. Thus, Muslims in Malaysia are more protected compared to those living in different countries.

### **1.4 Current Technologies in Checking Products’ Halal Status**

JAKIM as the main organization that is responsible in Malaysia for monitoring Halal industry has done many efforts to help protecting Muslims in facing issues with



Halal matters. They have done great jobs in making sure manufacturers follow strict guidelines and standards in making sure the products are Halal conformance. JAKIM do regular checking to manufacturers with Halal certificate, but it is hard for them to prevent those irresponsible companies from displaying fake Halal logo on their products' packaging. Many cases have been reported each year for abusing Halal logo. This issue does not only linger to small and medium enterprise but also to those big companies including four-star hotel (Bernama, 2009).

The realization by JAKIM on this issue has led them to optimize the available technology. On February 8<sup>th</sup>, 2006, JAKIM has announced e-Halal and SMS e-Halal technology (Utusan Malaysia, 2005). e-Halal is a portal developed by JAKIM for Muslims consumer in Malaysia to check the Halal status of the products in the market. They can just go to <http://www.halaljakim.gov.my> website to check the Halal status which is up-to-date (Bernama, 2011). They are several steps that the users should take before they can view the products' Halal status. After going to the website, they can just click on the tab "PENGGUNA" then "Direktori Halal Malaysia". A page showing a list of item types will be opened and user just need to click "Mulakan Carian" before the page for the searching opened. User can just type the name of the product, and then the portal will show the product details such as the name, the brand and also the manufacturer other than the end date of the Halal certificate. If the product manufacturer does not apply for the Halal certificate, the portal will display a blank table list.

This e-Halal portal also includes services for the people in the industry such as for them to apply for the Halal certificate. This portal also includes forum for people to put their enquiry, the latest news related to Halal issues and many more. Previously, almost every State Islamic Religious Department from each state can issues their own Halal certification. Somehow, due to a lot of issues such as confusion and integrity, JAKIM has decided to standardize the issuance of Halal certification in which only JAKIM's Halal certificate will be recognized and all of this State Islamic Religion Department will work together with JAKIM in this matter



(Bernama, 2011). Thus, the usage of e-Halal system will also be more broaden as all of these departments will also use the same system or portal.

The other service that been introduced by JAKIM together with e-Halal is the SMS e-Halal(Projakim 2006). This SMS e-Halal service is introduced to the Muslims consumers to ease them in determining the Halal status of a product especially when they are about to buy the product (Projakim, 2006). Other than that, the decision to make it on mobile comes by looking at the telecommunication industry report showing that the number of mobile phone users has exceeded the number of fixed line users in the year 2000 which shows the increase of the number of its user each day (Malaysian Communications and Multimedia Commission, 2005).

This service is very easy to use. They just need to type “HALAL (Product Barcode)” and send it to 32728 (63 Projakim 2006). Somehow, this method may only resolve Halal issue related to food that is manufactured only. It cannot be applied to food premises such as hotel and restaurants because all of these places do not have any barcode. So, JAKIM has come up with a certain mechanism that will allow user to use this service for such situation. JAKIM generates a serial number and a special barcode for every food Halal logo. So, user can use the barcode that is displayed together with the Halal logo which normally been displayed in front of the food premises (Bernama, 2009).

Once user sent the message, they will get a reply within few seconds. There are four basic answers for the reply; those are “Item is not in the list”, “Certificate has expired”, “Application still in progress” and “Valid certificate” (Projakim, 2006).

There are also other technologies that have been developed by other parties for determining products’ Halal status. One of it is using RFID technology (Anir, N.A., 2008). RFID is the short term for Radio Frequency Identification. There are three basic items that involves with this technology; those are RFID tag, RFID



reader and also associated middleware. The concept of RFID in Halal is that, a RFID tag will be embedded at the label to replace the Halal logo by the food manufacturer. This RFID tag will store the unique ID of the product in which the ID is mapped to JAKIM Halal database (Anir, N.A., 2008). This technique applies the same concept used in price checker in which user has to scan the barcode to the scanner to check the price of the item. Likewise, for this RFID concept, user should bring the tag that is embedded to the item packaging near the RFID reader. The RFID reader will then connects to the middleware. Middleware acts as a high level filter in which it functions as a connecting layer that will manage and process the flow of data coming from one or more tag. This system also will filter, aggregate and check the data so that the volume of information will be reduced before it is sent to the retailer's enterprise application (Anir, N.A., 2008).

There are many reasons for some people to agree with this RFID technology and the same goes for rejecting it. Main reason for people rejecting RFID implementation is about the price (Talib, A., 2008). RFID require RFID tag and it is pricy compared to barcode or logo in which we just need to print it on the packaging. Realizing about the cost difference, many people still opt for RFID technology. One of the main reasons is about integrity and to prevent fake Halal logo which is the main issue that we faced for quite sometimes now (Anir, N.A., 2008). One way to prevent fake Halal logo is to come up with anti-fake technology and that is the advantage of RFID. It is hard to fake the RFID tag, thus we are able to resolve the problem involving the fake Halal logo.

The other good thing about RFID is about time. Compared to the current technology that we have in determining the Halal status such as e-Halal portal and SMS e-Halal, RFID is much more less time consuming. RFID reader can read multiple tags at once. Thus, we could determine the Halal status faster compared to if we are to SMS one by one product details before we can identify their Halal status. This technology is also free for consumer usage (Talib, A., 2008).



Currently, people are moving towards Smartphone application. There are many platforms or operating systems for Smartphone such as iPhone operating system (iOS), Android and Blackberry OS. Among all of these three platforms, Android platform can be considered as the leader of all as it controls over forty-seven percent of the total operating system market shares (Casaretto, J., 2011). Muslims society also takes advantage of this new trend as there are quite a number of applications for consumer to check the Halal status of a product has been released in the application market. Many approaches have been used by the developers either through checking the item as a whole or checking the ingredients which have uncertainties such as the emulsifiers.

One of the applications that get thousands of installed is “Halal E-Codes”. This application basically helps user to check the information about the food ingredients such as the emulsifier (Fayyaz, M.A., 2011). The application will display a list of emulsifier number codes together with brief explanations about the items and its Halal status.

There are also many other applications in the market such as “Halal Checker” and “Halal Finder”. Somehow, they are reviewed as confusing and not accurate. All of this happens because it is hard to achieve high accuracy for such application. The reason is that, there are a lot of aspects to be considered in determining the Halal status of an item.

## **1.5 Issues with Halal Checking Technology**

Basically, there are two main technologies used in checking product's Halal status; those are e-Halal portal and also SMS e-Halal.

e-Halal portal provides all of the information require by consumers in validating products' Halal status. Somehow it has limitation in terms of mobility. The portal is meant for user to view it from the computer based on its resolution and



other factors. Often, computer or laptop is being used in a static place such as home or office. Other than that, it is immobile due to its size and weight. Often, users need to check products' Halal status when they are already in the hypermarket or shop that is when they want to buy or choose the item. This means, this portal would not be able to help them in times of needs, therefore, it is ineffective.

In overcoming problem with mobility, JAKIM has introduced SMS e-Halal. Somehow, it takes sometimes for user to type the item details, send it to the respective number and eventually receive the response (Projakim, 2006). It would be very tedious especially if the user plans to buy many items. Just imagine if checking one item takes five minutes. How much time does it require for consumer to check ten items. That would be nearly an hour. This shows that, SMS e-Halal is not efficient in terms of the time it consumed.

All of these problems show that user needs a tool that could allow them to check the Halal status of food product in the market which can give them instant result and fast. Other than that, the tool should not be as complicated as the available technologies. The tool should eliminate the need of the user to spend extra money when using it so that it could attract more people especially the Muslims. The most important aspect for this kind of application is that, the application should be built on mobile device. This is to ensure the effectiveness of the application. The reason is that, consumers will need this kind of application at times of need especially when they are at the supermarket or shops buying products. It is important to attract more people to use this tool as it could prevent Muslims from unintentionally buy and eventually consume non Halal or Shubhah food.

## **1.6 Smartphone and Android**

The problems with the available technology on checking food Halal status are they are costly, timely and not convenient. Therefore, the best hardware platform to develop the application would be Smartphone.



There are many reasons for Smartphone to be chosen as the hardware. The most obvious reasons are they are light, small, and it often been carried anywhere by the owner. Besides that, the capabilities and features of Smartphone itself are among the reason for it to be chosen. One of the reasons is that, Smartphone has third party operating system such as Android and iOS (Nicole, L., 2010). Other than that, Smartphone also has the capability to run third-party software which commonly known as “apps”. The existence of “apps store” also becomes one of the attractions for user to buy Smartphone as user can easily installed from more than hundred thousands of application from the apps store.

Besides that, it is recorded by GFK retail and technology Asia in 2010 that the sale of Smartphone in Malaysia has doubled compared to the previous year. This shows steep increase in demand for Smartphone.

There are several types of operating system in Smartphone. There are iPhone OS (iOS), Blackberry OS, Android, MS Windows, and others. Gartner’s analysis on global Smartphone sales shows that, Android market controls the overall market by forty-three percent compared to iOS which controls only eighteen percent of the total market share (Casaretto, J., 2011). Other than that, Android also has recorded a very massive growth as it earns “year over year (YoY)” of three hundreds and fifty-two percent (Casaretto, J., 2011). Year over Year is a method to evaluate the company’s financial performance by comparing the increase or decrease of the financial records between the current year and the previous year’s (Investopeida).

Looking at the technical side, each OS has their own advantages over the other. For example, iPhone operating system is well known for its slick and simple interface. It has multi-touch gestures for smooth navigation and the interface is designed for user ease of use. Compared to BlackBerry, the interface is very straightforward (Rene, R., 2008).

Somehow, Android has more advantages compared to other operating system because of its flexibility and choices (Whitson, G., 2011). One of the



flexibility shown by Android is on the hardware options. Android software platform is able to be implemented in wide range of phone manufacturers (Rene, R., 2008)(Whitson, G., 2011). This means, people can have more options from several phone manufacturers thus, this reduce the price of the phone due to the stiff competitiveness. Other than that, Android is an open source operating system which is based on LINUX and uses Java as its programming language. Therefore, the software development in Android would be limitless (Rene, R., 2008). Android which developed by Google also has a lot of advantages in terms of cloud connectivity. Android application can easily use the information and data from the wide sources of Google such as the Google Search, Google Maps and others (Rene, R., 2008). In terms of storage, Android also has better adaptability compare to iOS. One of the examples is that, user can easily change the SD card without any problem.

## **1.7 Barcode Scanning Technology**

Every manufactured product displays barcode on the packaging. Barcode can be defined as a method of representing data by combining series of vertical lines that contain product information. Often, barcode is formatted in European Article Numbering (EAN)-13 and it is used internationally for tagging retail goods (Junaini, S.N., 2008).

There is an open source library called Zxing (pronounced zebra crossing) developed to enable phone to act as barcode scanner. This application requires the phone to have at least these three features; those are camera of more than 1 mega pixel, mobile application processor and also digital signal processor in which, all of them are available in Smartphone. This application uses “Spiral Scanning Method” algorithm to detect the black bar of the barcode (Ohbuchi, E., 2004). The uses of barcode scanning technology will reduce the time to search for item details other than it is very convenience as it is very simple to use. Besides, barcode scanning technology also has been long in the market, thus it might increase user acceptance towards the product.

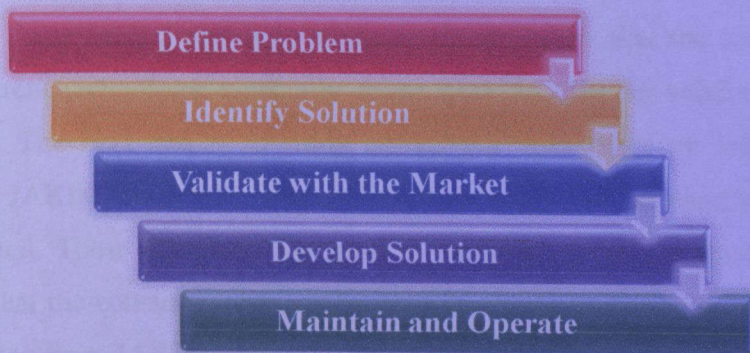


## CHAPTER 3

### METHODOLOGY

#### 3.1 Research Methodology and Project Activities

This project will be using two types of research methodologies. The methodologies used are waterfall and also agile methodology. The waterfall methodology would be used for the whole project activities. Meanwhile, the agile methodology would be used during the development of the product.



*Figure 1: Waterfall Methodology*

Based on the methodology above, it can be seen that this project has added a new activity into the waterfall model that is the “validate the market”.

##### 1. Define the problem

Based on the problem statement stated in the introduction part, the problem is defined further to understand the real problem that the consumers are having. The problem is refined by two ways that is through research and also through survey or questionnaire. Research conducted is meant to understand the current issues that revolve around Halal matters. The questionnaire otherwise, is to understand the problem and challenges that Muslims consumers are having in validating manufactured food products’ Halal status. The research is done by reading through journals, articles from the newspaper, read comment from the consumers in forums and others.



**2. Identify** The second method which is the questionnaire is meant to study the characteristics of the application or tool needed by the consumers in checking products' Halal status such as the level of convenience they require, and the type of equipment that they have. There are several questions that the respondents need to answer. Basically, the questionnaires are divided into five parts. The first part is to study the relation between consumers' age and their buying behaviour. The purpose of it is to study the best target age range of people that face the problem the most and also whether they could accept the propose technology in assisting them with the problem or issue that they are having right now.

The second part is to study on the problems that the consumers have with the current technology especially those from JAKIM on validating products' Halal status. The next one is to study consumers' awareness on information that released by JAKIM especially that information regarding product's Halal status being retracted. These questions are raise to study the effectiveness of the current technology that the consumers have other than to check whether consumers received the information from JAKIM especially those involving matters.

The fourth part of the questionnaire is to analyze the consumer's consideration in making sure of product's Halal status and also their requirements on application that could assist them in checking product's Halal status. These questions are meant to understand the type of tool that should be used and also the features required for the application.

The last part is the part to analyze and study the type of technology that consumers have. The purpose of it is to develop an application using the technology that most of the consumers have or would have in the future. All of the result from questionnaire will then be analyzed and eventually a solution would be proposed before developing it.



## **2. Identify Solution**

After gathering all the information required from the problem identification activity, the result would be separated into three parts. The first part is on the type of application needed by the consumers such as the level of convenience that the application should poses. The second part is to find the best tool or hardware to be used that will result in effectiveness of the application develop such as the technology use should be easily accepted by the target end user. The last part would be the information requires by the consumers in determining products' Halal status. Based on the second part of the questionnaire, a research on the tool should be made to search for the best equipment to be used as the platform or hardware for the propose solution.

Once it has been chosen, the proposed solution can then be designed according to consumers' requirements. The application should also provide several options for the consumers to choose from depend on their situations. Other than that, the application developed should also overcome the problem with the current technologies and the application should provide introduce new features.

## **3. Validate with the market**

Once the proposed solution has been designed, then it should be validated by the market. One of the ideas in validating the market is that, the proposed solution should be bring forward to JAKIM for them to review and approve. This is important as JAKIM is the main authority in Malaysia that governs all the Halal matters. Apart from that, the main idea of the project is to use the database from JAKIM during the checking process. Therefore, it is important to check with JAKIM whether the information requires by the application that is going to be build is contained in JAKIM database.

Apart from that, the proposed solution also should be reviewed and comment by the consumers as they are the person that would be the end user for the application. If everything is positive, this means, once the proposed solution being released to the market, the acceptance of it would be good.



#### 4. Develop Solution

There are two main aspects in solution development. One is to plan and design the identified solution and the other one is to develop the solution.

All of the identified tool's characteristics would be combined to produce a design for the application. The first identified solution to be considered is the hardware or tool that should be used. After that, is to look into the available features or applications that the hardware possesses. The available features of the hardware will then be analyzed to find one that is suitable with the project nature and requirement.

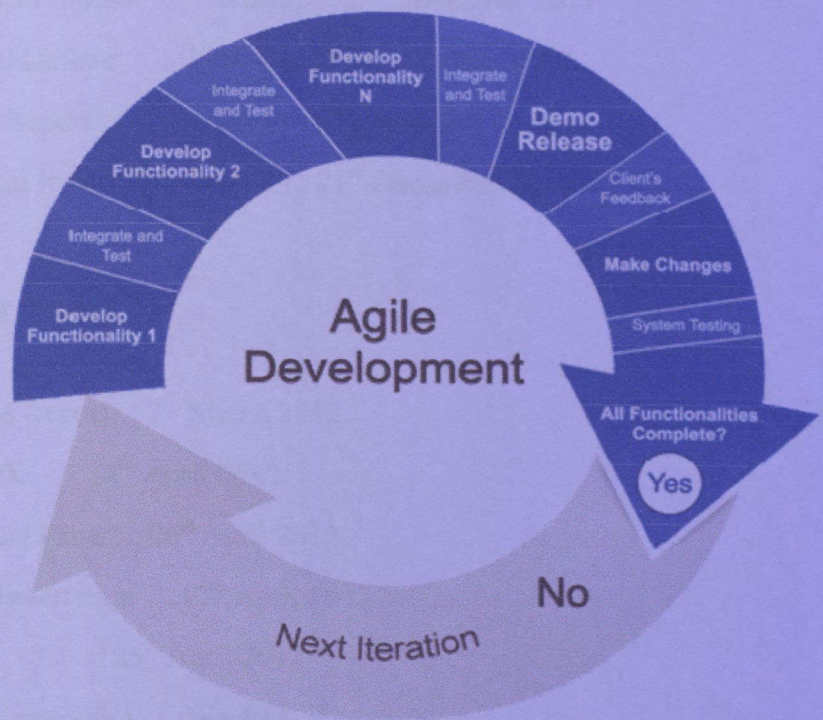
Once the hardware feature and application that are suitable to be used are recognized, then only the other features or requirements for the project are being inserted to the design. Then, there will be verification activity to check whether the design of the proposed solution meets the end user or the consumers' requirements. If the proposed solution is verified, then, the second part of product development will be started that is to develop the product.

The development of the product will be using agile methodology. In agile methodology, the solution for product will be divided into several parts. According to agile methodology, each part of the solution will be developed one after another. After the part of the solution is being developed, it will be tested first. If it works, then only the next part of the solution will be developed and tested. If it succeeds, it will be integrate with the previous part and another test would be done to make sure all of the integrated part works. This process will continue until the full features of the product are developed and integrated. If the application has been built with full features, a validation activity will be done to ensure that the developed product meets the end user requirements.

Once it is completed, the demo of the application will be released for users to test. The feedback from the user will then be used to improve the



application. After that, the whole application will be re-tested and if it works, then the application development is completed successfully. Meanwhile, if it does not work, the project needs to be re-do from the functionality development activity. Below is the figure showing the activities involve in agile development.



*Figure 2: Agile Methodology*

Basically, in this project, the part of the proposed solution that has been divided is the back end activities of the product.

**5. Maintain and Operate**

Once this application has been release to the market, it will just need to be maintained and improved from time to time especially in terms of GUI and information displayed.

### **3.2 Key Milestone**

#### **Final Year Project 1**

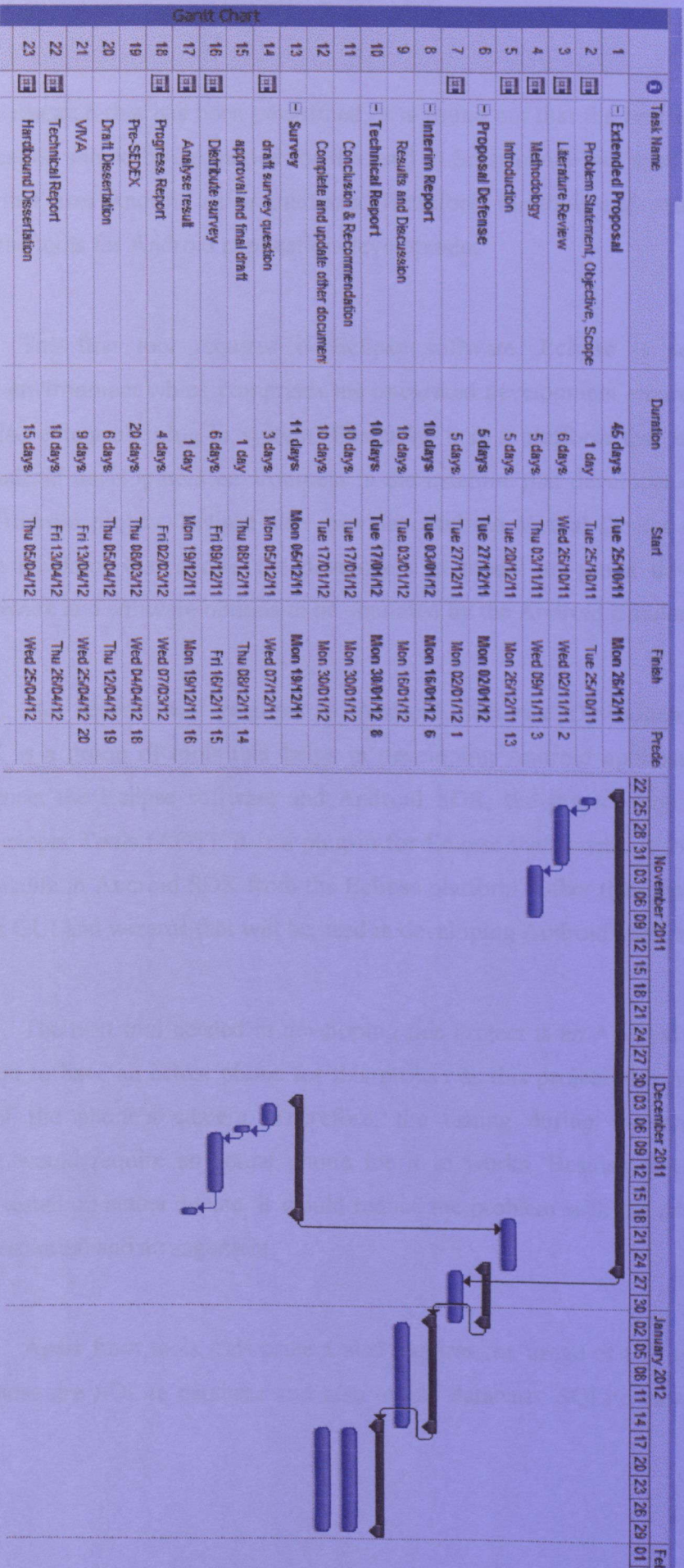
1. Title/ Proposal Selection : Week 3 : 12<sup>th</sup> October 2011
2. Extended Proposal : Week 6 : 2<sup>nd</sup> November 2011
3. Proposal Defene : Week 9 : 23<sup>rd</sup> November 2011
4. Interim Report : Week 11 : 7<sup>th</sup> December 2011
5. Technical Report : Week 13 : 21<sup>st</sup> December 2011

#### **Final Year Project 2**

1. Progress Report : 7<sup>th</sup> March 2012
2. Pre-EDX : 4<sup>th</sup> April 2012
3. Technical Paper : 26<sup>th</sup> April 2012
4. Draft Dissertation : 12<sup>th</sup> April 2012
5. VIVA : 25<sup>th</sup> April 2012
6. Final Dissertation : Week14



3.3 Gantt Chart





### 3.4 Tools

Based on the research that has been performed, it is found out that the best solution for the application should be developed for the used in Smartphone and specifically, Smartphone that uses Android as its platform. Therefore, the tools and equipment required are the tools for Android application development.

The first tool requires is Eclipse software. Eclipse is software development environment which comprises the integrated development environment (IDE) and also extensible plug-in system. Basically, it is a platform that helps to create the Android development environment in the machine that developer used to develop an Android project. Eclipse also provides Android Virtual Device (AVD) which is the emulator that allows the developers to model an actual device by defining hardware and software options to be emulated by the Android Emulator.

The second tool requires is Android Software Development Kit (SDK). SDK is a group of tools that helps in developing Android application. In order to connect the Eclipse software and Android SDK, the project requires the Android Developer Tools (ADT). It is a plug-in for Eclipse that functions to access the tools available in Android SDK from the Eclipse platform. Other than that, ADT also provides GUI and wizards that will be used in developing Android application.

The next tool needed in developing this project is an Android phone. It is important to have an actual phone for this project as this project also involves the usage of the phone's camera. Therefore, the testing during the prototype development would require an actual phone for it to works. Besides that, if the prototype is tested on actual device, it would reduce the problem with the product's alignment, resolution and arrangement.

Apart from tools, this project also requires the usage of two types of databases; those are SQLite database and also online database. SQLite database is



stored inside the phone memory. The purpose of using this database is to reduce the searching time of the products other than to allow users to use this product without the presence of internet connection. The online database for this project is meant to represent the JAKIM's database of Halal products. It is planned that the SQLite database will sync and update the information based on the online database once there is internet connection.

This prototype development would require the usage of several programming languages; those are Java, PHP and XML. Java is used to develop the application at the client machine such as the graphical user interface (GUI), the barcode scanner and also to output the result. The PHP scripting language will be used to connect and sync the inner database of the application with the online database.

The development of the barcode scanning technology would require the usage of Zxing (pronounce as zebra crossing) library. Zxing is a multi-format 1D/2D barcode image processing library with clients for Android, Java. It is an open source project that enables the built-in camera on mobile phones to scan and decode the barcodes on the device without communicating with server. It also support many barcode formats such as UPC-A, EAN-8 and EAN-13.

In summary, the tools are needed to cover the different needs of the application development. Eclipse software and the Android SDK are needed to code and write the application program, the databases are meant to store the data and product details, and the Zxing to make the barcode functionality works and runs.

## CHAPTER 4

### RESULTS AND DISCUSSION

#### 4.1 Findings

There are two problems identification methods were conducted in the first stage of this project; those are research and questionnaire. These methods were conducted to study and to get information that are required for this project. Both of these methods were conducted in parallel and were done in several stages. The first stage is meant to grasp the issues that revolved around Halal matters. It was done through research from journals, newspaper articles, websites and many other sources. Then, through questionnaires, the findings from the research were verified with the respondents. Other than that, the questionnaires also are meant to provide better understanding on the issues that consumers especially the Muslims are having in terms of making sure food products' Halal status.

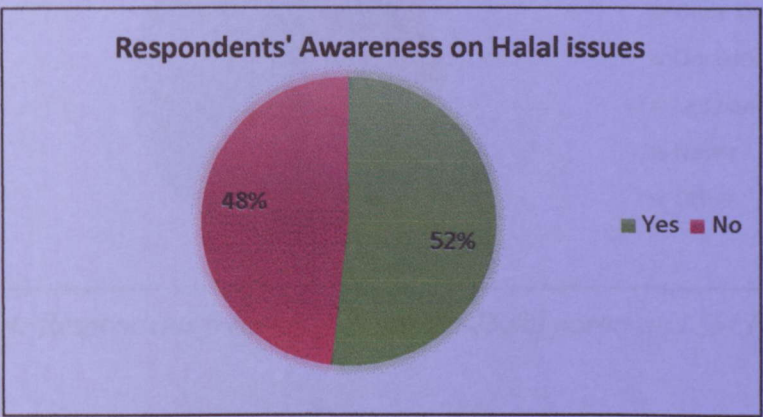
The findings from the research have found out that, Muslims faced a lot of challenges in getting Halal food products. Among the challenges are issues with manufacturer displaying fake Halal logo and manufacturer-made Halal logo on the food products' packaging. Besides that, there is also problem with Halal certificate from non-approved organization. Retracted Halal certificate is also the main issues faced by the Muslims as they do not receive the information about the retraction of the food products.

Besides the issues faced by the Muslims with regards to food Halal status, study also been performed to find out the problems with the current technologies in checking food products' Halal status. It is found out that, the current technologies are costly, timely and are not convenient. The problems with the current technologies causes them to be inefficient to the consumers which results only small number of consumers use the technologies available. The result of the questionnaire is written in the data gathering and analysis part below.



## 4.2 Data Gathering and Analysis

Among the questions asked in the questionnaire is to determine the awareness level of Muslims society towards Halal issues. A recent issue on the retraction of Halal certification of a food manufacturing company was asked. The result obtained is displayed in the figure below.

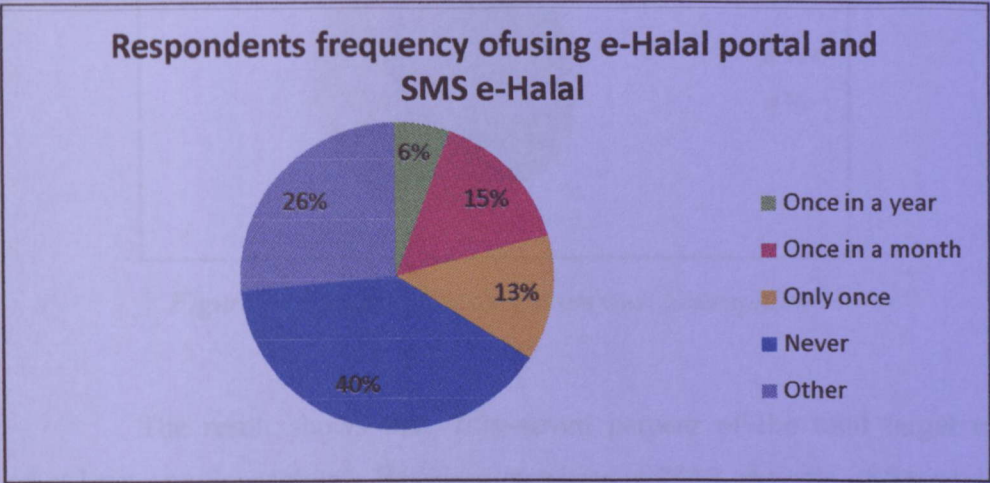


*Figure 3: Respondents' Awareness on Halal issues*

Based on figure 2 above, it can be identified that, out of the total number of fifty-two people that answer the questionnaire, forty-eight percent of them does not aware of the issue. If induction is made based on the findings, it could be said that, a total number of 8,921,956 Muslims in Malaysia which constitute of sixty-four percent of the total population 28,728,607 number of people (70 The Star 2011). This shows that, this percentage of people, whom are not aware of the Halal related matters are very worrisome. One of the main reasons for this issue is that, there is lack of medium to acknowledge people about the news or issue. Thus, this could lead many Muslims to consume non Halal food unintended due to their lack of awareness. This really shows that Muslims are in need of a tool that they can use to check the integrity of food products' Halal status.

Questions on the Halal technologies available were also asked. The questions were asking about how frequent respondents are using the available technologies by JAKIM like the e-Halal portal and SMS e-Halal and the reason for

their action. The chart below demonstrates the frequency of respondents utilizing the technology available.

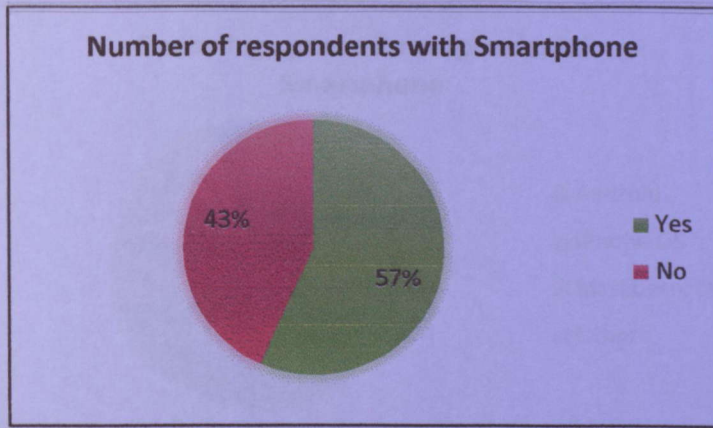


*Figure 4: Respondents frequency of using e-Halal portal and SMS e-Halal*

Based on the chart above, it can be seen that most of the respondents are either never used the technologies or use it in rare occasion. Among the reasons that have been pointed out is that, they are not aware of the existence of the technologies; they are just too much steps involved and many others. A behavioural study has also been made to identify the reasons for people to use the technologies less often. There are three main reasons for these technologies to receive less response from the people; those are time, cost, mobility and convenience issues.

Realizing these issues, questions with regards to determining the best concept or tool to be used for Halal checking activity were asked. One of the questions was meant to identify the suitable technology to be used in developing the application. The question that was asked is to get the percentage of people that owned at least one Smartphone. The result is shown in the pie chart below.



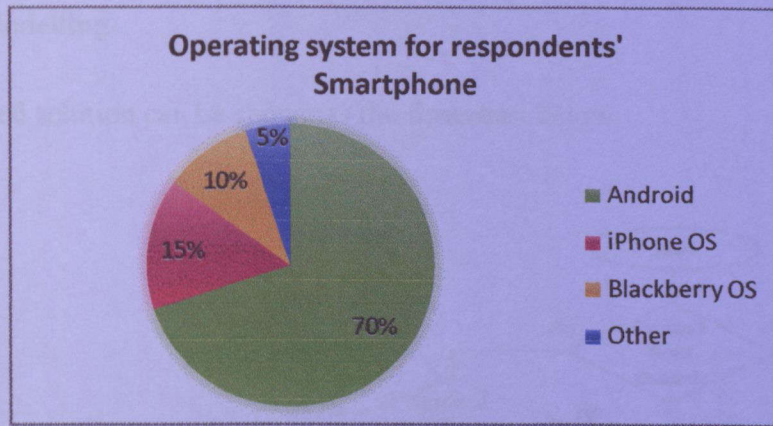


*Figure 5: Number of respondents own Smartphone*

The result shows that, fifty-seven percent of the total target users owned at least one Smartphone. Based on statistics in 2010, the sale of Smartphone in Malaysia has doubled then the previous year. The current trend also shows people are currently buying Smartphone instead of the feature phone as the price is lessen day by day but the functionalities keep improving. Therefore, Smartphone which is mobile, light and convenience could be a suitable machine for developing the application as it could help to overcome the problem with the current technology that the users have which does not support mobility and not convenience.

There are many different types of operating system for Smartphone such as Android, Blackberry OS, iPhone OS and others. Thus, it is important to verify the operating system that the respondents used so that, the platform used for the application development can be determined. Therefore, one of the questions asked in the questionnaire is the operating system of the respondents' Smartphone. Figure 8 shows the finding based on the questionnaire.





*Figure 6: Percentage of operating system for respondents' Smartphone*

Based on the findings in figure 5, it is shown that, seventy percent of the respondents are using Android as the operating system for their Smartphone. This means, out of all of the operating system available, Android operating system should be chosen as the platform of the proposed solution. This is a good sign for the application as Android has many specialties and also available features.

Overall, the findings have found out that Muslims are having great challenges in terms of getting Halal food. Among the challenges are fake Halal logo, Halal certificate from unapproved organization, retracted Halal logo and many others. Research and questionnaire made can be concluded that Muslims need an application to check food Halal status which runs on Smartphone with Android operating system as its platform.



### 4.3 Modelling

The proposed solution can be shown as the flowchart below.

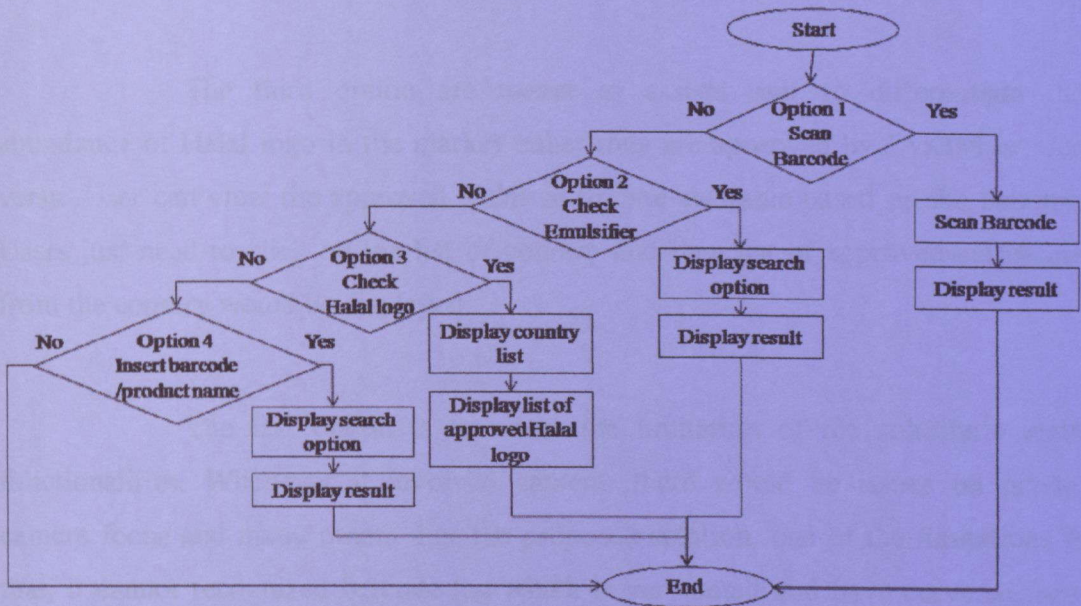


Figure 7: Proposed solutions' flowchart

Basically, this solution would have four functionalities. They are:

1. Check product's Halal status by scanning the product's barcode
2. Check product's emulsifier
3. Determining the validity of the Halal logo based on the displayed Halal logo in the application.
4. Insert the product's barcode or product's name to check its Halal status.

The first option which is checking food products' Halal status is the main functionality of the proposed solution. The reason for the solution to use barcode scanning technology is that, it is very common among the people so that user could accept the solution better. Besides that, all manufactured food would contain a unique barcode, thus, it can be used to identify products.



The second option is to check products' emulsifier. The reason is that, most of the causes for a food product to become not Halal is because of the emulsifier used. Therefore, consumers can also check the emulsifier contained in the product to determine the Halal status of the product.

The third option are meant to assists user to differentiate the abundance of Halal logo in the market either they are approved by JAKIM or vice versa. User can view the approved Halal certificate available based on the country. Users just need to click on the list of country and then list of approved certificate from the country would be displayed.

The last option is to cover the limitation of the solution's main functionalities. Whenever it involved camera, there would be issues on pixels, camera focus and many others. For the proposed solution, one of the limitations is that, it cannot recognized barcode tag which is very small and have curve surface. Therefore, one way to overcome the limitation is to enable the users to input the barcode unique id to the application.

A use case diagram has been draw as below to provide better understanding on the process involved.



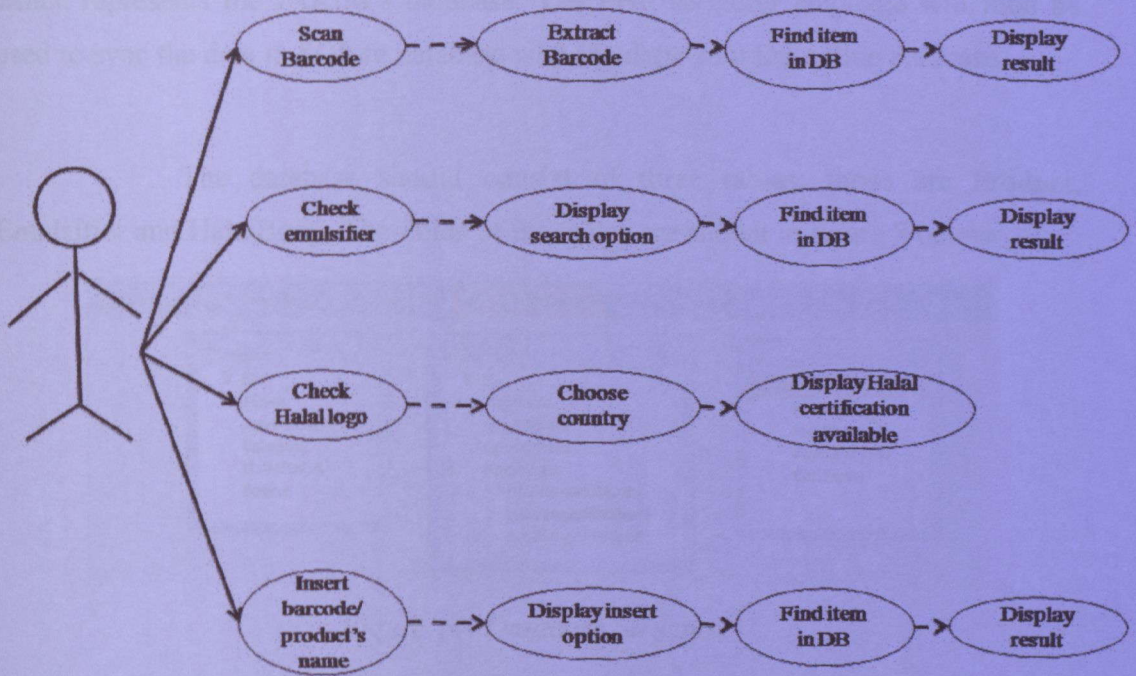


Figure 8: Use case diagram

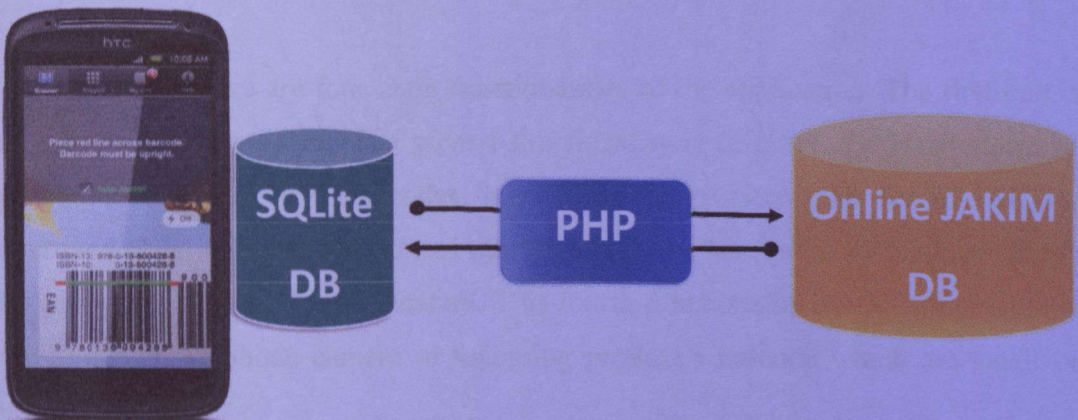


Figure 9: Application Model

Figure 7 above shows the model for the application development. The proposed solution would have two types of databases. The first one is SQLite database which recites in the phone memory and the other one is the online database



which represents the JAKIM’s database. The PHP scripting language will then be used to sync the data in SQLite database with the data from the online database.

The database should consist of three tables; those are Product, Emulsifier and HalalBody. The fields of the tables are shown in figure 8 below:



Figure 10: Database Structure

4.4      **Prototype**

The propose solution should be very simple for the convenience of the users. The application shall not take much of the user’s time as the application may be use during hectic time.

There are four main functionalities of the application. The first one is to scan product’s barcode. The second functionality is to check the Halal status of product’s emulsifier or the e-codes. Next functionality is to view list of JAKIM-approved Halal organization around the world and the last one is to input product’s barcode manually into the application. This fourth functionality is made to overcome the limitation of phone camera in focussing product’s barcode which are small or unclear.



The main menu of the application is shown below.

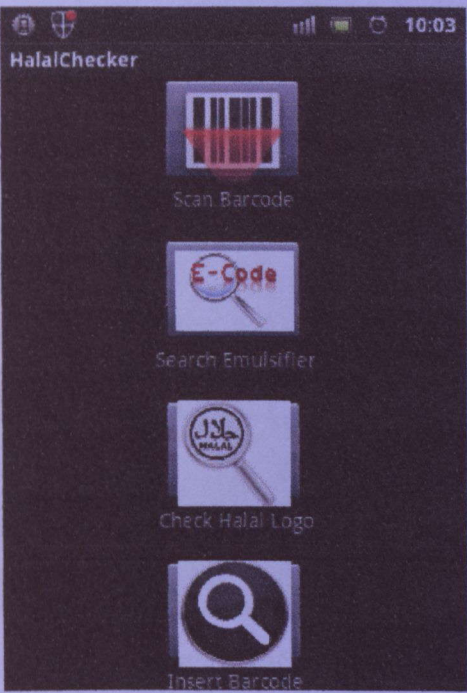


Figure 11: Main Menu Page

When the first option is clicked, the application will show page below for user to place the barcode inside the viewfinder.

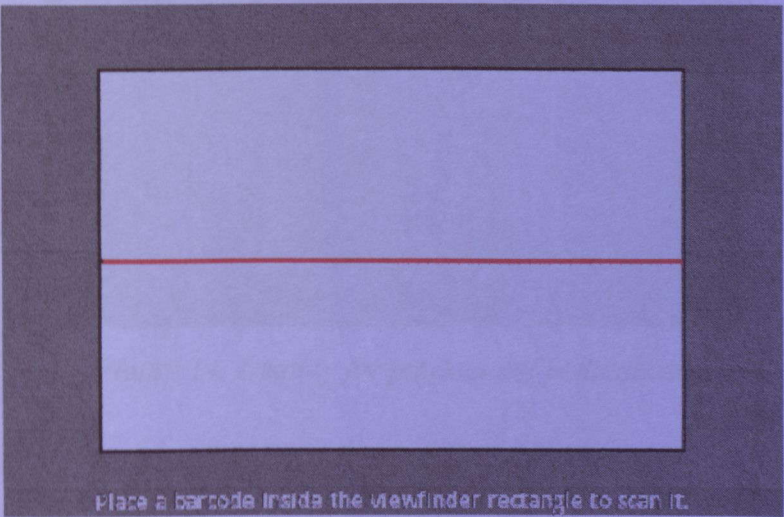


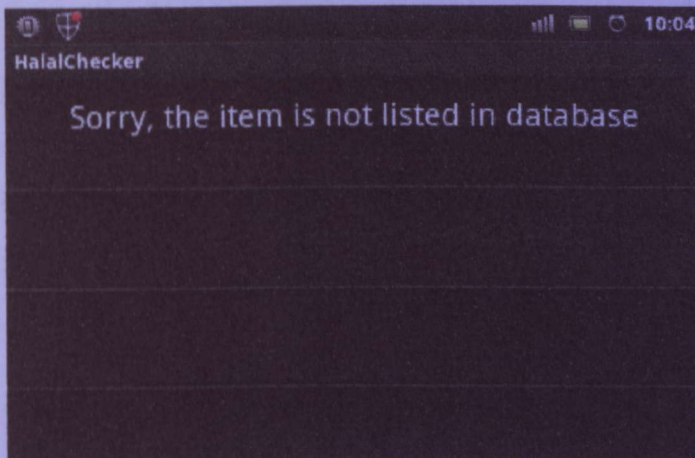
Figure 12: Barcode scanning page

Once the application detects the barcode, it will process and compare the barcode with rows in the database. There will be two types of outputs. The first one is when the product's barcode matched with one of the barcode inside the database. The application will display below output.



*Figure 13: Display for Halal product*

If the application could not find a match, this means the product is not listed in the database. So, the application will display below output.



*Figure 14: Display for product not in database*

Apart from checking product's Halal status using barcode, user can also check the Halal status of the product's emulsifier. User would need to type in the emulsifier code into the field available and click button search, then, the application will display the emulsifier code, material, type of the emulsifier and the

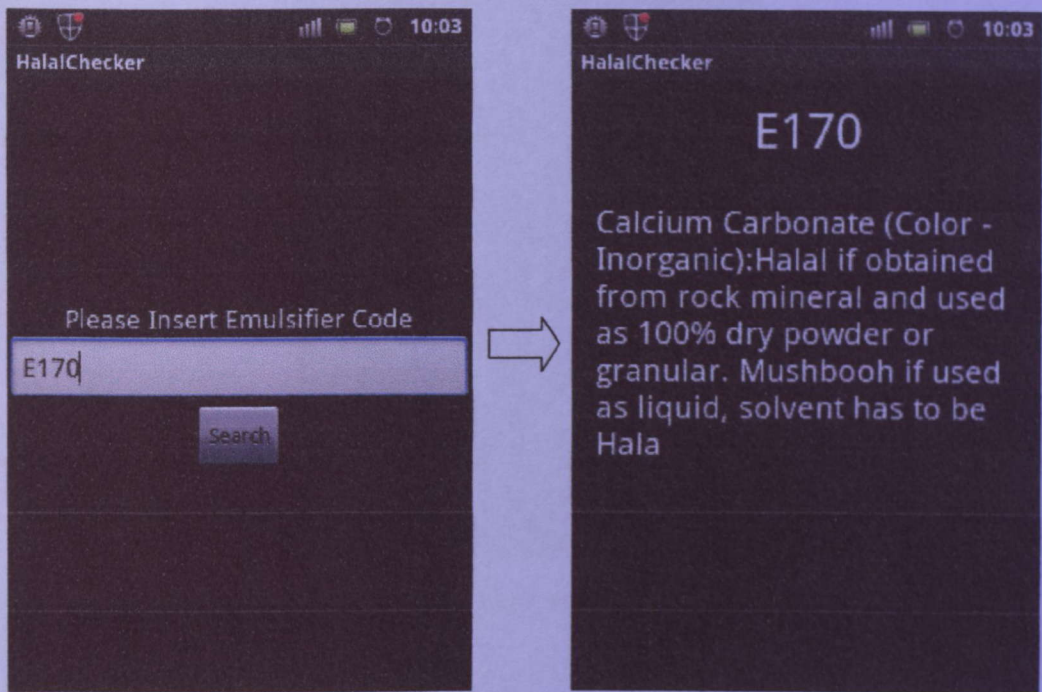




*Figure 16: JAKIM approved Halal organization*

After testing was conducted, it was found out that there are several challenges when phone camera is being used as the barcode reader. One of the limitations is with the phone focussing capability and when the barcode is not clear. So, this application also provides the user to insert the product's barcode manually into the system. Basically, the output after user has entered the product barcode would be similar to the output shown in the first functionality as they are meant for the same purpose that is to check product's Halal status through the product's barcode. The screen shot is shown below.

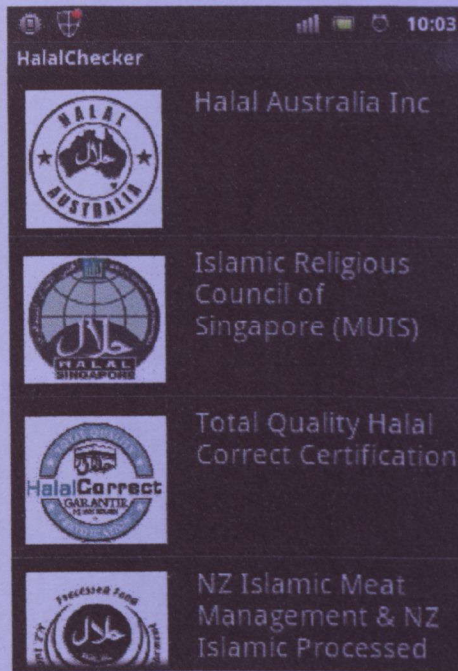
description of the emulsifier Halal status. The display is shown in the screenshot below.



*Figure 15: Food Ingredients E-Codes*

This application would also help user to identify the Halal organizations that are approved by JAKIM as there are abundance of Halal logo in the market. User can scroll down the list to view the Halal organizations that are approved by JAKIM and their logos. The screenshot of the functionality is displayed below.





*Figure 16: JAKIM approved Halal organization*

After testing was conducted, it was found out that there are several challenges when phone camera is being used as the barcode reader. One of the limitations is with the phone focussing capability and when the barcode is not clear. So, this application also provides the user to insert the product's barcode manually into the system. Basically, the output after user has entered the product barcode would be similar to the output shown in the first functionality as they are meant for the same purpose that is to check product's Halal status through the product's barcode. The screen shot is shown below.



application’s tester. The first one is System Usability Scale (SUS) and the next one is the Questionnaire for User Interaction Satisfaction (QUIS).

Among the questions asked in the SUS is about the respondent’s opinion about the feel towards the application that is would they use the application frequently and the response is displayed in the chart below.

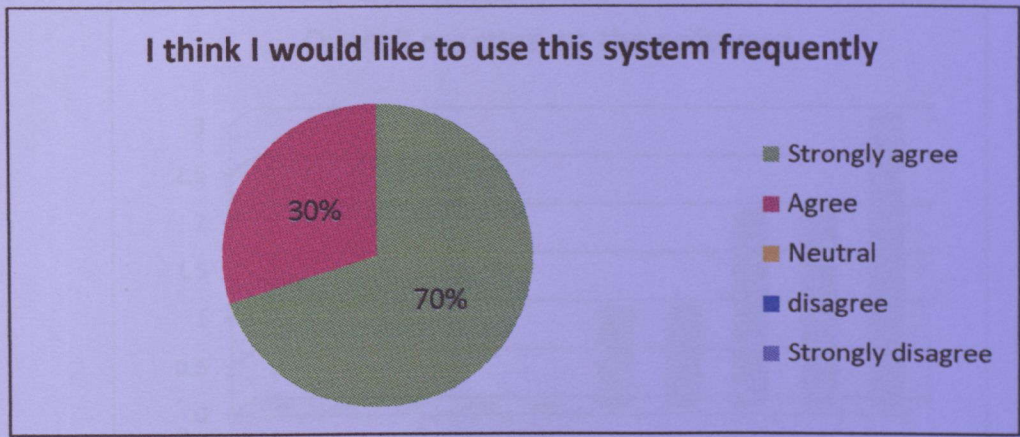


Figure 18: Frequency people wish to use the system

The next question asked in the SUS is on the learning to use the application. The response is recorded in chart below.

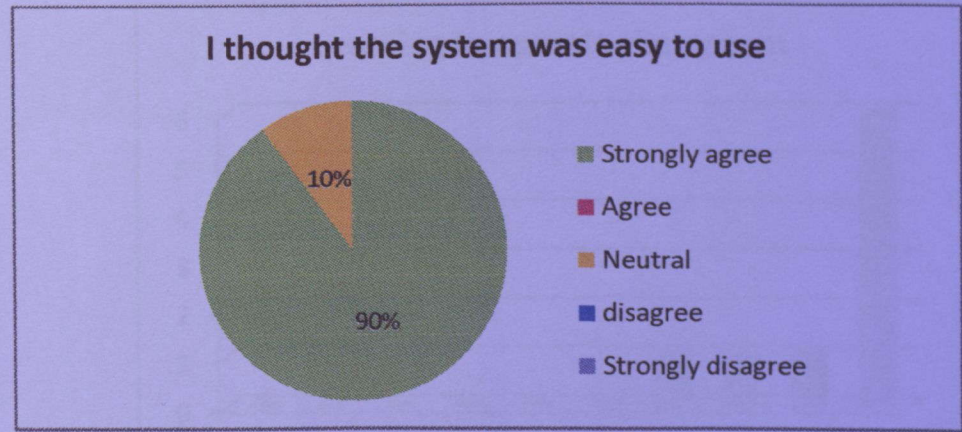


Figure 19: System easiness



Both the results. The QUIS was divided into four parts; those are overall reaction toward the software, learning to operate the system, organization of information on screen and lastly the system speed. Basically, the overall reaction toward the software and the learning to operate the system questions would represent the user acceptance towards this application.

The result for the two questions is shown in figures below.

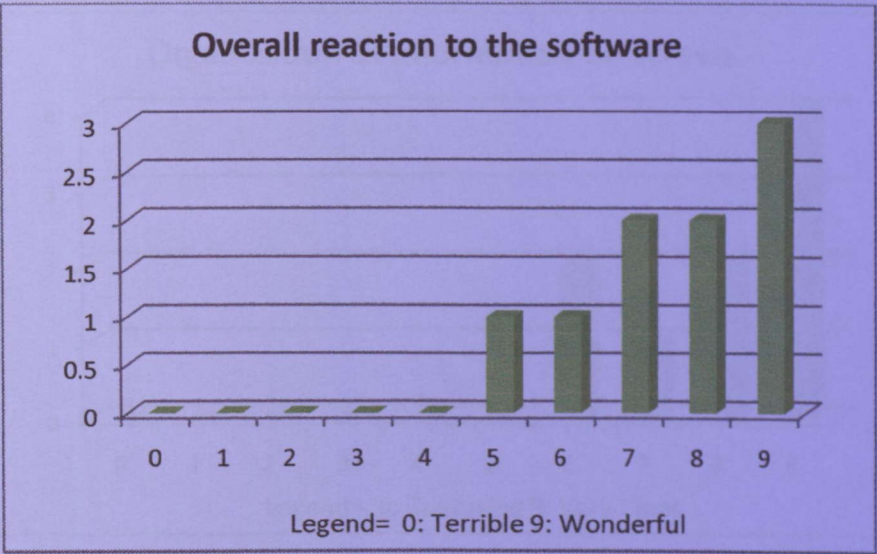


Figure 20: Overall reaction to the software

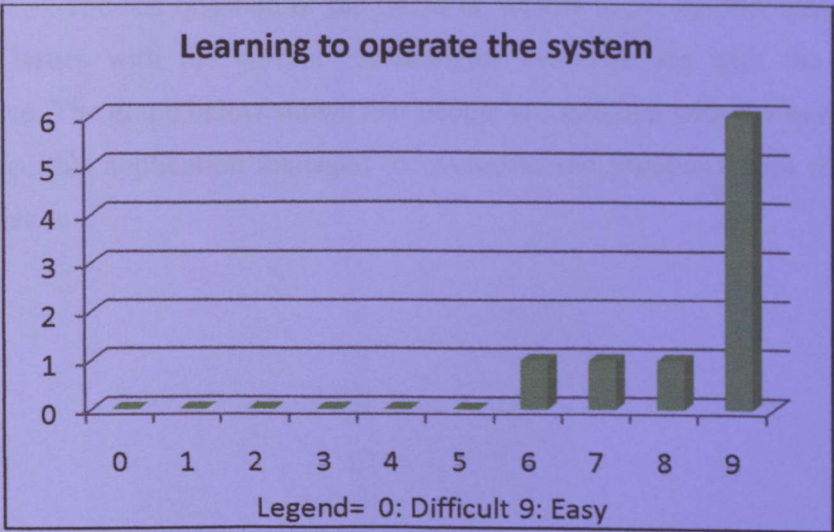


Figure 21: Learning to operate the system

Both the results show that people can easily accept this product to be used in their everyday life as they rate the system with more than five scores.

The third question for the QUIS was about the organization of information on screen. The result would represent users understanding towards the information that is conveyed by the application.

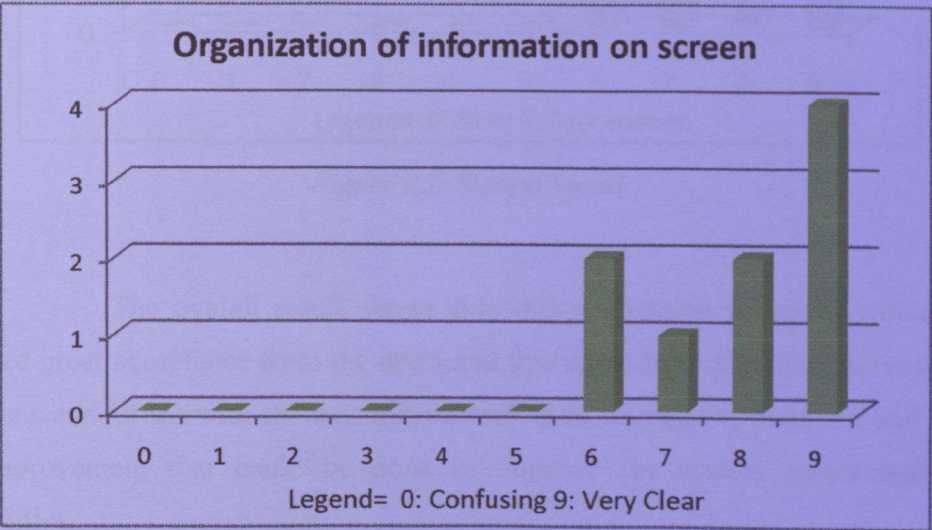


Figure 22: Organization of information on screen

The last question of the QUIS is regards to the system speed. Among the main issues with the current technologies available are with the time and convenience. The graph below shows that people are satisfied with the system speed. This means, this application managed to overcome the problems with the existing technologies.



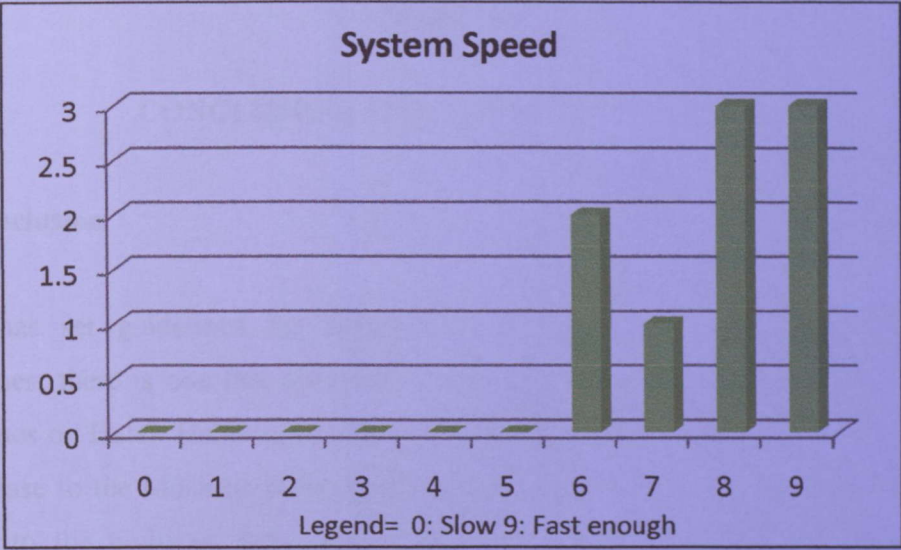


Figure 23: System speed

The overall result shows that this application proposed would have received great acceptance from the users and this application may also overcome the problems and issues with the existing technologies. Somehow, there are still rooms for improvement that could be done to improve the system performance and capabilities.

## CHAPTER 5

### CONCLUSION AND RECOMMENDATION

#### 5.1 Conclusion

Islam has set guidelines for Muslims to follow. Among the most important guidelines, there is one that always revolved around Muslims everyday life that is guidelines on Halal. Halal concept covers wide areas of Muslims life but one of the most close to the Muslims is the Halal concept in food. As a human, food supplies energy to the body so that, human able to live their everyday life. The Halal guideline set on food is meant to keep the body healthy, which may harmonize the society other than to preserve the Muslims' faith.

Realizing the fast growing of Muslims community has open manufacturers' eyes to participate in the Halal industry. More and more manufacturer ventures into Halal industry every day. Food products sell in the market does not only come from local manufacturer but also from other countries including those non Islamic countries.

As food products come from many different countries, there would be a wide variety of Halal certification in the market. Therefore, Muslims need to be extra careful when buying food products in the market. The reason is that, Halal certification logo used on the food packaging may not come from organizations that have been approved by JAKIM. Some products manufacturer display Halal logo which is very simple that is it only writes Halal word in Arabic.

Other than that, there are many issues have been reported with regards to Halal certification. One of them is one the fake Halal logo. Often, manufacturers display fake Halal logo in their packaging to attract more customers especially Muslims to buy their product. Besides that, there could be reasons behind they do not have the real Halal certification. One of it might be because there are processed in



non Halal way or they obtain their resources from non Halal supplier. Therefore, it is very threatening for Muslims consumers as they might not have the knowledge to validate products' Halal status.

There are also other issues revolved around Halal certification such as if the Halal certification is being retracted by the certificate issuer. There should be strong reason for product's Halal statuses get retracted and normally the reason would be the products are no longer compliance to Halal standards. Somehow, when the products' Halal certificates are being retracted, the products that have been distributed should already reach the market. Out of knowledge, consumers will still buy the products as the packaging still displaying the Halal logo. This could also lead to Muslims especially to consume non Halal food unintendedly.

In Malaysia, there is one main organization that governs issues related to Halal matters. They do inspection based on Halal standards and the certificate is recognized by many countries as it has been established for a very long time and it also follows strict standard in issuing the Halal certificate to the manufacturers.

The only problem that consumer is having is on the platform to get the information from JAKIM. Although JAKIM has introduces two technologies that helps consumer to check product Halal status, but due to its inefficiency, many of the consumers does not use the technologies.

Therefore, this project comes up with an idea to study on making an effective tool or application that consumer can use when buying or choosing food products in the market. The study is made through research on journals, questionnaires and even meeting with JAKIM to make sure the product developed is accurate, convenience and also effective.

The idea for this project is to scan the product's barcode and check it with JAKIM's database. The reason for using JAKIM's database is to ensure the



integrity of the result as JAKIM's Halal certification is known as one of the most recognized Halal certificate worldwide.

The whole project would be using waterfall methodology which includes problem identification stage, proposing solution stage, validating solution with the market, problem development and lastly to maintain and operate the product.

Meanwhile, agile methodology will be used during the solution development stage. The proposed solution will then be designed into a proposed product first. After that, it would be divided into different parts based on the functionality. This is where the agile methodology will be implemented that is the product is developed based on functionality. The functionality will be built or developed one after another. After a functionality being developed, it will tested first to make sure it works perfectly. Once the functionality developed and tested successfully, it will be integrated with the previous functionality that has been developed and tested. The process goes until a complete system or product managed to be built.

After that, the product will be tested with the end user for validation purpose that means, to check whether the product developed meets the end user requirements. Other than that, the purpose is to let the end user review and comment on the product developed. The comment will then be used to make improvements on the product developed. After changes have been made, another testing will be made to make sure it functions properly. If the result shows negative results, the process of developing the functionality need to be re-do again until a complete, effective and usable product managed to be produced.

Lastly, it is hope that the application developed would contributes to the Muslims society and becomes one of the most important tools in Muslims' everyday life as Muslims nowadays are very exposed to being tricked to consume Haram products which will results in many negative impacts.



## 5.2 Recommendation

Right now, this application only focused on manufactured food. Somehow, Halal covers wider area not only manufactured food. It also covers equipments, meat, cosmetics, restaurants and others. Therefore, it is hope that this application could be expand to bigger scope in the future until it could check almost every item that involves Halal issues.

On the 8<sup>th</sup> April 2012, JAKIM has announced Halal Verified Engine (HVE). HVE would enable user to check the Halal status of products not only from Malaysia but also products from all over the world. HVE would store information about products that are certified Halal by JAKIM and also products that are certified Halal by all of the Halal organization that are approved by JAKIM. If this project can collaborate with HVE project by JAKIM, this project could become huge. This will greatly expand the capability and the scope of this application as it could be used by Muslims all over the world.

Other than that, technology always evolved. Thus, it is also hopes that this application would also evolve and fits with every technology that will be introduced in the future.

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## APPENDICES

### APPENDIX I

Participant ID: \_\_\_\_\_ Site: \_\_\_\_\_

Date: \_\_\_\_/\_\_\_\_/\_\_\_\_

#### System Usability Scale

**Instructions:** For each of the following statements, mark one box that best describes your reactions to the website *today*.

		Strongly Disagree				Strongly Agree
1.	I think that I would like to use this website frequently.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	I found this website unnecessarily complex.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	I thought this website was easy to use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	I think that I would need assistance to be able to use this website.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	I found the various functions in this website were well integrated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.	I thought there was too much inconsistency in this website.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.	I would imagine that most people would learn to use this website very quickly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.	I found this website very cumbersome/awkward to use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.	I felt very confident using this website.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.	I needed to learn a lot of things before I could get going with this website.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please provide any comments about this website:



## APPENDIX II

### Q.U.I.S Generic Use Interface Questionnaire

OVERALL REACTIONS TO THE SOFTWARE														
<div style="display: flex; justify-content: space-between; padding: 5px;"> <span>terrible</span> <span>wonderful</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>0</span><span>1</span><span>2</span><span>3</span><span>4</span><span>5</span><span>6</span><span>7</span><span>8</span><span>9</span> </div>														
<div style="display: flex; justify-content: space-between; padding: 5px;"> <span>inadequate power</span> <span>adequate power</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>0</span><span>1</span><span>2</span><span>3</span><span>4</span><span>5</span><span>6</span><span>7</span><span>8</span><span>9</span> </div>														
<div style="display: flex; justify-content: space-between; padding: 5px;"> <span>difficult</span> <span>easy</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>0</span><span>1</span><span>2</span><span>3</span><span>4</span><span>5</span><span>6</span><span>7</span><span>8</span><span>9</span> </div>														
<div style="display: flex; justify-content: space-between; padding: 5px;"> <span>dull</span> <span>stimulating</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>0</span><span>1</span><span>2</span><span>3</span><span>4</span><span>5</span><span>6</span><span>7</span><span>8</span><span>9</span> </div>														
<div style="display: flex; justify-content: space-between; padding: 5px;"> <span>frustrating</span> <span>satisfying</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>0</span><span>1</span><span>2</span><span>3</span><span>4</span><span>5</span><span>6</span><span>7</span><span>8</span><span>9</span> </div>														
<div style="display: flex; justify-content: space-between; padding: 5px;"> <span>rigid</span> <span>flexible</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>0</span><span>1</span><span>2</span><span>3</span><span>4</span><span>5</span><span>6</span><span>7</span><span>8</span><span>9</span> </div>														

SCREEN														
<div style="display: flex; justify-content: space-between; padding: 5px;"> <span>Characters on the computer screen</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>hard to read</span> <span>easy to read</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>0</span><span>1</span><span>2</span><span>3</span><span>4</span><span>5</span><span>6</span><span>7</span><span>8</span><span>9</span> </div>														
<div style="display: flex; justify-content: space-between; padding: 5px;"> <span>Sequence of screens</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>confusing</span> <span>very clear</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>0</span><span>1</span><span>2</span><span>3</span><span>4</span><span>5</span><span>6</span><span>7</span><span>8</span><span>9</span> </div>														
<div style="display: flex; justify-content: space-between; padding: 5px;"> <span>Highlighting on the screen simplifies task</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>not at all</span> <span>very much</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>0</span><span>1</span><span>2</span><span>3</span><span>4</span><span>5</span><span>6</span><span>7</span><span>8</span><span>9</span> </div>														
<div style="display: flex; justify-content: space-between; padding: 5px;"> <span>Organization of information on screen</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>confusing</span> <span>very clear</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>0</span><span>1</span><span>2</span><span>3</span><span>4</span><span>5</span><span>6</span><span>7</span><span>8</span><span>9</span> </div>														

• LEARNING														
<div style="display: flex; justify-content: space-between; padding: 5px;"> <span>Learning to operate the system</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>difficult</span> <span>easy</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>0</span><span>1</span><span>2</span><span>3</span><span>4</span><span>5</span><span>6</span><span>7</span><span>8</span><span>9</span> </div>														
<div style="display: flex; justify-content: space-between; padding: 5px;"> <span>Tasks can be performed in a straight-forward manner</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>never</span> <span>always</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>0</span><span>1</span><span>2</span><span>3</span><span>4</span><span>5</span><span>6</span><span>7</span><span>8</span><span>9</span> </div>														
<div style="display: flex; justify-content: space-between; padding: 5px;"> <span>Exploring new features by trial and error</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>difficult</span> <span>easy</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>0</span><span>1</span><span>2</span><span>3</span><span>4</span><span>5</span><span>6</span><span>7</span><span>8</span><span>9</span> </div>														
<div style="display: flex; justify-content: space-between; padding: 5px;"> <span>Remembering navigation / use of commands</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>difficult</span> <span>easy</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>0</span><span>1</span><span>2</span><span>3</span><span>4</span><span>5</span><span>6</span><span>7</span><span>8</span><span>9</span> </div>														

• SYSTEM CAPABILITIES														
<div style="display: flex; justify-content: space-between; padding: 5px;"> <span>System speed</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>slow</span> <span>fast enough</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>0</span><span>1</span><span>2</span><span>3</span><span>4</span><span>5</span><span>6</span><span>7</span><span>8</span><span>9</span> </div>														
<div style="display: flex; justify-content: space-between; padding: 5px;"> <span>Correcting your mistakes</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>difficult</span> <span>easy</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>0</span><span>1</span><span>2</span><span>3</span><span>4</span><span>5</span><span>6</span><span>7</span><span>8</span><span>9</span> </div>														
<div style="display: flex; justify-content: space-between; padding: 5px;"> <span>System reliability</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>unreliable</span> <span>reliable</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>0</span><span>1</span><span>2</span><span>3</span><span>4</span><span>5</span><span>6</span><span>7</span><span>8</span><span>9</span> </div>														
<div style="display: flex; justify-content: space-between; padding: 5px;"> <span>Experienced and inexperienced users' needs are taken into consideration</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>never</span> <span>always</span> </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> <span>0</span><span>1</span><span>2</span><span>3</span><span>4</span><span>5</span><span>6</span><span>7</span><span>8</span><span>9</span> </div>														